

THE OPEN UNIVERSITY OF SRI LANKA
FACULTY OF ENGINEERING TECHNOLOGY
DEPARTMENT OF MECHANICAL ENGINEERING
DIPLOMA IN TECHNOLOGY - LEVEL 4
FINAL EXAMINATION 2009/2010



MEX 4232--AUTOMOBILE TECHNOLOGY

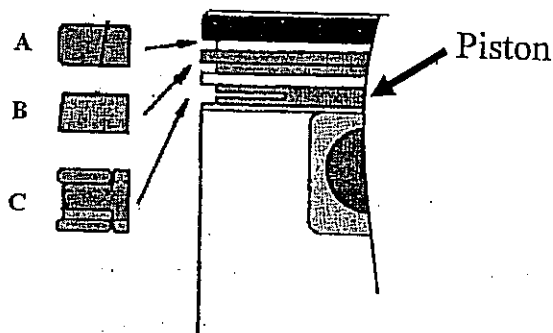
DATE : 20th March 2010 (Saturday)
TIME : 1330-1630 HRS
DURATION : THREE HOURS

INSTRUCTIONS

1. This paper consists of eight (08) questions. Answer **any five** questions.
2. All questions carry equal marks.
3. In case of a doubt consult the supervisor or an invigilator conducting the examination.

Question 01

- a) According to the current exhaust emission regulations, the opacity is controlled in compression ignition engines whereas CO and HC concentrations are controlled in spark ignition engines. Explain with reasons why the CO and HC concentrations are not controlled in Compression ignition engines and why the opacity is not controlled in spark ignition engines.
- b) A section of a piston and three piston rings indicated by A, B and C are shown in the figure. Identify A, B and C and briefly explain their functions.



Question 02

- a) Explain the term compression ratio with respect to a gasoline engine
- b) Illustrate the Dual combustion cycle on a P-V diagram and name each of the processes indicating the beginning of each process by letters p,q,r,s,t and hence define compression ratio and cut-off ratio.

Question 03

- a) Explain the term "Cooling load" with reference to an automobile air-conditioning system.
- b) Explain the role of a catalytic converter in the exhaust pollution control system.
- c) Briefly explain how the ignition timing is controlled in a modern electronically controlled fuel injection and ignition engine.

Question 04

- a) A three cylinder four stroke spark ignition engine with a cylinder bore diameter of 90 mm and a stroke of 110 mm was tested on an engine dynamometer and the following results were observed.

Engine speed	- 3200 rev/min
Brake torque	- 120 Nm
Volume flow rate of fuel	- 0.14 litres/min
Volume flow rate of air	- 1.78 m ³ /min
Specific gravity of fuel	- 0.82
Calorific value of fuel	- 45 MJ/kg

Determine the following parameters of the engine.

- I. Brake power
- II. Brake mean effective pressure
- III. Brake thermal efficiency
- IV. Volumetric efficiency

Question 5

- a) With aid of neat sketches, explain the terms Toe, Camber and Caster in relation to the wheel alignment of the steering system of an automobile.
- b) Explain what is meant by dwell angle of a spark ignition engine.

Question 6

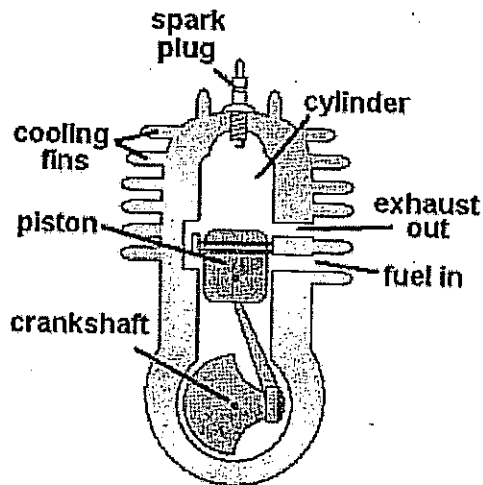
- a) Explain the difference between the fluid flywheel and the torque converter.
- b) Explain the process of turbo charging of an engine, with aid of sketches.

Question 7

- a) Draw a valve timing diagram for a single cylinder four stroke spark ignition engine and explain the sequence of valve opening and closing.
- b) Explain why the shaft connecting the steering wheel to the steering gear (rack) is made in two or more separate parts linked together by means of universal joints.

Question 8

- (a) Briefly explain how the ignition timing is controlled in a conventional carburettor type gasoline engine.
- (b) Identify the type of engine shown in the figure given below; and explain how it operates.



END.

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